

# Governance network structures and urban environmental policy making — a case study in Helsinki, Finland

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This paper describes changes in local environmental governance through the framework of governance. Governance literature states that policy making has moved from a centralized governmental process to an open negotiation involving various actors from both public and private sectors. The changes affect both the decision-making processes and policy focus, as measured by the issue areas included. The analysis is based on the City of Helsinki. The data used consists of 75 interviews with organizational representatives, as well as archival data. Descriptive measures of social network analysis are used to describe the links between the network and the policy decisions.

## Introduction

The framework of traditional political science focuses on government and the distribution of power. Numerous alternative governance theories have emerged, which place the locus of attention on decision-making processes and the aggregation of information (Kooiman 1993, 2003, Rhodes 1996, Pierre and Peters 2005). Communication network structures in particular are deemed important determinants for outcomes in collective decision-making processes (van Kersbergen and van Waarden 2004). The governance theory or framework also highlights the multiple levels of government in competition with each other, in which there is no clear hierarchy (Bache and Flinders 2004). The aim of this paper is to apply the governance framework to a descriptive analysis of local environmental policy-making. The question is, does a description of the networks explain policy choice?

An empirical analysis based on data concerning Helsinki aims to demonstrate those features of policy-making processes in modern societies that do not conform to the traditional separation of governmental powers into the spheres of legislative, executive, and judicial. Instead of a central legislative body, such as a parliament in the national context, or a city council in the local context, decisions are made by networks of organizations. The same holds true for the executive powers in the city government or the city board, or the judicial power of various legal bodies, as both the execution and monitoring of the selected policies are entrusted to the same network of organizations.

These concepts are explored through features of the environmental decision-making process in the City of Helsinki, where policy making is a result a pluricentric, interorganizational process. The government itself is not a unified body, but a collection of institutions with their own histories, and most importantly, preferences and objectives

that may contradict those of other governmental agencies. As the complexity of the problems necessitates the inclusion of private actors in the decision-making process, the number of conflicting interests involved grows even larger.

The policy process is continuous and complex. The types of policy instruments available usually lead towards choices that the executive body cannot unilaterally supervise or enforce and the same organizational network has to be activated and involved in determining policy compliance and success. In environmental policy, decision on the best available technologies are one example in which the government must rely on experts from outside the government, and most often, from outside the public research institutions.

The data focuses on the preparation networks of a single policy programme. The document is the Helsinki Ecological Sustainability Programme for 2005–2008. The programme included policy measures for all sectors of society within the scope of the city's actions, as well as the official, binding environmental policy for Helsinki. Thus, it should be considered the single most important defining document of environmental public action in the capital of Finland. Yet, given the instruments and measures chosen for the policy, it should not be taken as an example of environmental policy trumping other policy issues — especially economic policy. Still, an overview of the process is interesting as it serves to exemplify collective decision-making in the context of the local environment.

The next chapters describe the collective decision-making process and its focal points through the issues raised by the theory of governance. Firstly, the pluricentric nature of modern policy and the motives behind this development are discussed, followed by the process of delegating of responsibility to multiple actors, which necessitates network building. The structures of the organizational communication network have important effects on the final policy choice. A networked decision-making process, however, does not imply equal importance of all the actors involved, and the networks are more than a simple membership structure. It is a highly complex structure, resulting from the individual decisions of the actors involved. I

highlight this through the concept of issue areas within environmental policy. The policy process is then depicted as a complex, open-ended process, where the mobilization of expertise is more important than power struggles.

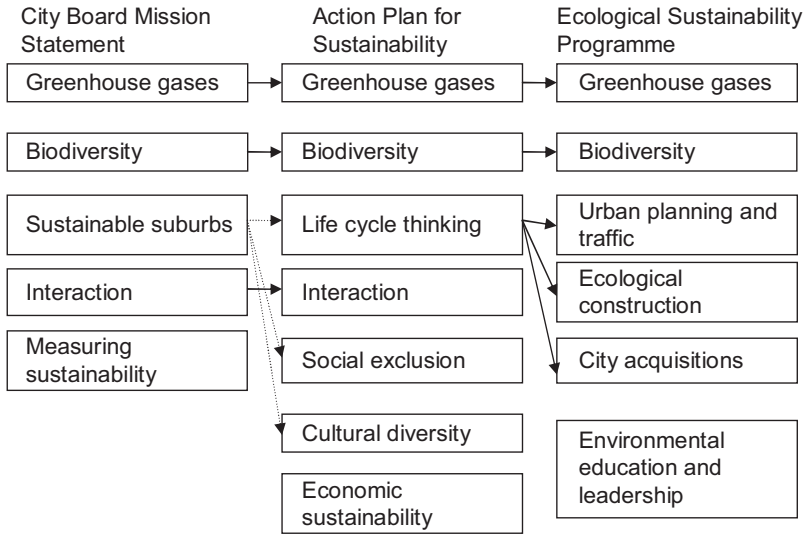
## Material and methods

### Background

Helsinki is the capital of Finland with a population of 570 000 inhabitants in the municipality proper and 1 300 000 in the metropolitan area. The area accounts for a quarter of the population and a third of the gross domestic product of Finland. The relative size of the area makes the local environmental policy important nationally, but Helsinki has posited itself as a leader and an example in the field for other localities as well.

The analysis focuses on the policy process and communication networks in environmental policy-making in Helsinki. I concentrate on the process of drafting and preparing for the Helsinki Ecological Sustainability Programme (HESP), the main environmental policy document for the city. What makes the programme especially appealing for analysis is the explicit networked nature of its preparation: not only were multiple organizations from both the public and the private spheres involved in the drafting of the document, they were explicitly called on to be involved by the central executive body of the city.

The policy process that resulted in the HESP policy started at the initiation of the City Board, the main executive body of the city organization. The goal was to build a Local Agenda for Sustainability into the 21st century, as indicated by joining the Aalborg treaty ([http://ec.europa.eu/environment/urban/pdf/aalborg\\_charter.pdf](http://ec.europa.eu/environment/urban/pdf/aalborg_charter.pdf)) in 1995. Based on the ideas of the United Nations' sustainability agenda, a group of European cities started to put together agendas for sustainable cities. The initiative resulted in the process leading to the Helsinki Action Plan for Sustainability. The agenda does not define concrete measures or instruments, but rather goals that should be attained for Helsinki to achieve sustainability. Thus, the HESP was needed for the Action Plan



**Fig. 1.** The themes of sustainable development as indicated by the major policy documents.

to be put into effect. However, the goals of sustainability shifted considerably as the original mission statement given by the City Board, to the Action Plan, and then into the HESP (Fig. 1). My aim here is to demonstrate how the structure of the network in the preparation process of the HESP was instrumental in motivating these differences, and in the weight given to the various issue areas as measured by the number of instrument choices.

The difference between the goals is mostly in emphasis. The various goals do not contradict each other, and all can be understood within the framework of sustainable cities in general. Still, the move from the politically motivated goals (i.e. sustainable suburbs) in the document provided by the City Board to the more general goals in the Action Plan with citizen involvement, as well as on the fairly technical goals in the HESP, is informative. In governance, the role of the elected executive is as much managerial as it is political. The complexity of the policy issues means that no single body is able to make efficient decisions, and the role of the public bodies is that of a network manager (Klijn and Koppenjan 2000).

The programme had been approved in 2005, and the policies included were to be executed between 2005 and 2008. The policy agenda was to be based on the earlier local sustainability agenda, but focusing on ecological sustainability

and the technical implementation of the goals set therein. The draft process began in early 2003, so the policy formulation phase lasted over two years. During this time, the goals of the policy process changed slightly, but it still managed to produce a fairly coherent policy document. The HESP includes the shorter, official environmental policy for Helsinki, which was approved by the city council, and the longer, executive part defining the relevant themes and objectives as well as concrete measures for the programme. The whole document was approved by the City Board, who stipulated that it should serve as a guideline in all actions taken by city agencies.

## Data

Data on the policy process is based on administrative documents and in-depth, semi-structured interviews with organizational representatives of the organizations involved. The documents included are mostly preceding policy documents and various minutes and proceedings from meetings concerning the issue (examples of the most significant ones are listed in Table 1). The choice of organizations to be included in the data was based on listings of organizations involved in recent Helsinki Environmental Policy Programmes. The list is assumed to include most of the organizations with an interest in the process,

**Table 1.** Examples of archival document sources used (see Jalonen 2002 for more information).

Document	Year approved	In force	Description
1st Helsinki Environmental Programme	1990	1990–1994	Focus on traditional end-of-pipe measures
2nd Helsinki Environmental Programme	1994	1994–1998	Focus on sustainable development
3rd Helsinki Environmental Programme	1999	1999–2002	More specific; focus on issues within the jurisdiction of the city
The Helsinki Action Plan for Sustainability	2002		Local sustainability agenda, process open to all citizens
The Helsinki Ecological Sustainability Programme	2005	2005–2008	The main focus of the analysis; also the 4th environmental programme
HESP Follow-up study	2007		

but any organization that was not allowed or did not wish to participate in the official preparatory processes is excluded. The assumption should not be overly problematic, as the process was fairly open to anyone wishing to collaborate, and there is no strong controversy in local environmental policies that would make a group or type of organization opt out. The data includes political, administrative, non-governmental non-profit organizations as well as private corporations (Table 2).

The main body of the data is the communication network of the organizations. The interviews with the representatives of the organizations focused on the media, frequency, and type of communication to each of the other organizations. In policy negotiations, information sent through broadcast methods, i.e. media that make the communication available to all parties, is usually less influential than confident, pair-wise communication (Knoke 1990). Thus, the focus of the data is on communication directed at a single communication partner, or a small exclusive group of partners, such as in a meeting. The communicating bodies are assumed to be the organizations, not the persons interviewed; this is obviously not an unproblematic assumption, but one that is usually made in political network research (Heinz *et al.* 1990). A single network based on the HESP policy process is used for most of the analysis.

The representatives interviewed were either general managers (i.e. CEOs, chairpersons) in the smaller organizations or environmental branch managers in the larger ones. Before

the interview each interviewee was asked to recall all of their interorganizational collaboration related to environmental policy, and when applicable bring any possible materials on this collaboration to the interview. The first part of the interview was a discussion of the communication processes in general, while the second part focused on specific interactions. Since network data based on free recall by interviewees has been found to have considerable memory bias issues (Marsden 2005), the questions were amended with memory prompts specific to each organization, based on public documents and previously completed interviews. The last part of the interview consisted of a discussion on the importance of the various environmental issues to the functioning of the organization. The interview questions were open-ended, but the answers were given a numerical coding for the analysis.

An important characteristic of policy is the open and dynamic nature of the decision-making

**Table 2.** Types of organizations included in the interview data set.

<b>Public</b>	
Political (executive/legislative)	2
Administrative	21
City subsidiary	5
<b>Private</b>	
NGO — environmental focus	11
NGO — local, citizen focus	14
Interest group	11
Company	14
<b>Total</b>	<b>78</b>

processes. This is manifest in the structure of the HESP, as it cannot be considered in the traditional context of the policy process, where identification of a problem is followed by the formulation of proposals for solving it, after which one is chosen, and (possibly) the effects of the chosen policy are later evaluated. In governance processes, on the other hand, the policy issue is consistently redefined, the definition of the problem is part of the solution, and the implementation is part of the decision-making process, as the problem is not stable even after a decision is made.

This poses two problems for the data. First, the interview is necessarily only a slice in time in the changing process. Second, the slice in time the interviewee describes is already in the past, and his later knowledge has altered his view on the policy, but also on the drafting process. The first issue could have been dealt through panel data, which was unattainable, as the interviewees would not agree to repeated in-depth interviews over extended periods of time. The second was ameliorated by completing the interviews relatively soon after the process took place.

In general, the interviewees saw the draft process as an important influence on the policy process. Representatives of smaller organizations sometimes expressed frustration with the different possibilities of the organizations to act within the network. The analysis here points to the importance of network position, which could be the source of the frustration. However, most of the interviewees viewed the policy as very important for the organization, and thus expressed interest in the interviews and found it is easy to recall the details of prior events.

## Methodology

The analysis was done using descriptive methods of social network analysis (Wasserman and Faust 1994), combined with the terminology and framework of the theory of governance. The focus was on the measures of centrality (Bonacich 1987, Borgatti 2005), the concept of structural holes (Burt 1992, 2000a, 2000b), and the clustering or the subgroup structures in the network (De Nooy *et al.* 2005). The analyses

were completed using measures available in two program packages dedicated to social network analysis: Ucinet (Borgatti *et al.* 2004) and Pajek (Batagelj and Mrvar 2007).

The methods of social network analysis assume that actors are interdependent, that their interdependencies have effects on the transfers of both material and immaterial resources, and that the structure of the relationships resulting from the interdependencies shapes the effects (Wasserman and Faust 1994). A network is defined as a set of relations for a given set of actors. For political networks, the relations of interest are flows of resources (monetary support between organizations), as well as trustworthy, stable communication relations. Here, I use a single communication network for the analyses. As the data is based on both interviews and archival data, a cut-off point was used to determine the inclusion or exclusion of communication links: as long as both interviewees mentioned having collaboration with the other, or one of the interviewees mentioned it and it was supported by archival records (i.e. the two organizations had representatives in the same key organization), the two organizations were deemed to have a communication relation.

The resulting network lists the relations between 78 organizations involved in the making of the Helsinki environmental policy. The density of the network, or the proportion of observed ties to the maximal number of (or the complete network), is 0.20. This is roughly in line with densities observed in other policy network studies (Laumann and Knoke 1987), and highlights the need for summarizing network measures in describing the network, as even in the fairly small 78-actor network this amounts to more than 600 hundred communication ties.

Centrality measures are used to summarize the positions of the actors through their prestige prominence. The four measures are: degree or simple centrality, closeness centrality, betweenness centrality, and eigenvector centrality, both for single actors and groups of actors (Everett and Borgatti 2005). Degree centrality is simply the number of ties an actor has, or equivalently, the number of ties a group has to actors outside the group. While this very rough measure can serve as an index of popularity, the more

complex measures are more appropriate in the network, where influence does not necessarily have to be direct, and where indirect influence through brokers is also beneficial. Closeness centrality is the sum of the lengths of the communication paths from the actor to all other actors (Borgatti 2005). It is a measure of the differences between the actors' ability to broadcast information to the whole network. In the policy-making context, closeness measures the ability to distribute uncontroversial or technical information. Betweenness, on the other hand, measures the number of times an actor is needed to relate messages in the network. For actor  $k$ , betweenness is defined as the share of times actor  $i$  needs actor  $k$  in order to reach actor  $j$ . In the political context, actors with high betweenness can use their position to withhold information, or to prioritize passing on information that is in accordance with their preference. Finally, eigenvector centrality differentiates the connections between the actors: not only is having connections important, but having connections to other central actors is important. Taking the principal eigenvector of the network matrix results in a count of all walks or unrestricted paths from actors, weighted inversely by length (Bonacich 1972, Borgatti 2005). The measure is appropriate for forms of influence that can be repeated: for example, repeated influence can matter in changing one's opinion, but repeating uncontroversial knowledge once already known has no further effect. Thus, this measure is probably the most efficient for measuring influence over policy decisions, and is hereafter referred to as influence centrality.

Structural holes are related to the betweenness centrality measure, but are even more focused on the possibilities of actors to play others against each other by controlling the flow of information. A structural hole is the missing link in a group of three actors, allowing the one in between to control all interactions between the other two. Generalized over all possible triads, or groups of three, structural holes measure the aggregate structural constraint of an actor. In a variety of negotiation settings, a low structural constraint indicating multiple structural holes has been identified as a factor contributing to negotiation success and social capital (Burt 2000b). I use the concept

to explore the constraints on different types of actors in the network, as well as to compare the constraints in different subnetworks defined by issue area, and thus try to establish how much effect the constraint structure of the network has in policy negotiations.

Similarly, I explore the differences between issue areas through the concept of network cores. Cores are maximal subnetworks in which each actor has at least a given number of connections within the network; the required number is indicated by the parameter  $k$ , and the measure is called  $k$ -cores (De Nooy *et al.* 2005). In policy networks, cores are naturally formed around single issues, as actors with similar interests seek support from similar actors. Critical examinations of politics often point to an overly influential central clique; however, the  $k$ -cores are a different measure, as they can just as easily be relegated to the periphery of the whole network as given the role of a central actor.

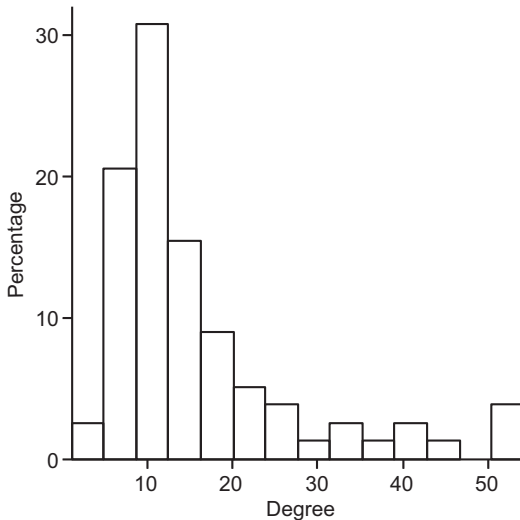
The main interest of the analysis was to link the structural measures indicated above to the substantial policy. The descriptive summary of the network measures should shed light on the policy-making process from a different point of view. Because the policy process at hand, the making of the HESP document, did not involve the either-or or division-of-the-cake situations politics often does, it was not possible to link the measures to power, or even to the interests of the various organizations. It was more appropriate to focus on expertise and influence through that.

## Results

### Centrality measures

As discussed above, the aim of this paper is to demonstrate the exploration of a communication network structure using the methodology developed in the field of social network analysis. The four different centrality measures (Table 3) give a general overview of the building blocks of the communication structure. The raw degree distribution (Fig. 2) shows that a handful of organizations maintain connections to a majority of others. These organizations are mostly city administration representatives, who





**Fig. 2.** Distribution of number of communication links, degree, per organization.

are often also required to maintain collaboration by statute, at least within the city administration. However, the other centrality scores show that it might not be efficient to maintain heavy connectedness or simple popularity, if organizations are seeking to use the network for broadcasting information, brokering negotiations, or influence attitudes. On the other centrality scores, the differences between those with the most connections and those with considerably less are significantly smaller.

Closeness centrality, standardized to vary between a minimum of 0 (for an organization that cannot reach all the other network participants at all) and a maximum of 1 (for an organization that is directly connected to all the other organizations), shows all organizations are fairly similar in their efforts they need to have their message reach throughout the whole network. Close-

ness centrality scores are all within two standard deviations from the mean. Closeness is related to the diffusion of ideas (Scott 1992). Thus, the HESP network can be seen as egalitarian in the opportunities for advancement of policy ideas, if the degree distribution is used as a baseline. Also, the closeness scores point to low levels of polarization in the network. Unlike the images of policy-making, displayed it as a unidimensional left-right — struggle, the local environmental policy network has no great cleavage — not even between environmentalists and industry.

Betweenness centrality, on the other hand, emphasizes the importance of the central actors. The majority of the actors in the network have a betweenness score of zero, as they are not needed in the flow of information within the network. Yet, all the scores are low, the highest being 0.13 (with the theoretical maximum for a star-shaped network being one). The actors with the highest betweenness scores are representatives of the administration, as should be expected based on the degree measure and its high correlation with the betweenness scores ( $r = 0.879$ ). Still, this emphasizes the coordinating role of the administration: instead of it being a top-down hierarchy, where political power is a result of formal status. Government actors, even within the framework of governance (Pierre and Peters 2005) are significant as coordinators or managers of the networked process.

The last of the centrality measures, eigenvector centrality or influence centrality, accounts for the differences in importance of one's communication partners. The more connected they are, the more they contribute to one's potential influence influence potential in the network. It is probably the best of the measures for assessing the changed role of government in the process. It indicates that the formal organization has retained the most important role in the policy network. The political actors are all connected to each other, yet still form the center of the network, even if it can be diluted in cases of policy issue expertise concerns and the like. The influence centrality offers a more traditional look at the policy even within the private sector: the more important links are controlled by the interest groups, while other private bodies are less central. Still, all the scores are low: with a

**Table 3.** Descriptive statistics for the centrality measures used.

Centrality measure	Mean	SD	Min	Max
Degree	15.948	11.643	1	54
Betweenness	0.011	0.025	0.00	0.13
Closeness	0.550	0.065	0.418	0.67
Eigenvector	0.097	0.059	0.012	0.262

maximum of 0.262 with a theoretical maximum of one; the conclusion should be that the network remains open (Table 4).

The centrality measures together describe a highly connected network, where information can reach all actors quickly. Closeness does not vary greatly, implying that no areas, sectors, or groups are totally sidelined in the process. Regardless, some actors can maintain influential positions by appearing at all the important discussions, and keeping up their positions as an intermediaries. Theoretically, the results are best seen as an answer to the critics of governance theory (Peters and Pierre 1998), who base their criticism on the inability of governance to account for the continuing importance of government. Indeed, some of the writers have emphasized the role of governing without government (Rhodes 1996). An empirical approach to the policy networks observed can solve this dilemma by posing the importance of government as an empirically determined question. Here, the centrality measures display government agencies as the most important actors in the policy field, even though private actors have gained influence and access to the decision-making process.

# Structural holes

The concept of structural holes links the discussion more closely to the ongoing debates on social capital (*see* Porter 1998 for a review). Structural holes are also related to the concept of weak ties (Granovetter 1973), the linkages between strong cohesive groups that end up being the most important ties in defining the social

structure and its effects on micro-level behaviour. For a triad, or a group of three actors, the structural hole is easily defined as the position between two actors who need to communicate. For the whole network, I have used two measures to compare the aggregate constraint that the structural holes place on the organizations. Thus, the measure is calculated on the organization that is in the weaker position, not that benefiting from the structural hole is beneficial. The aggregate constraint measures vary between one, for an organization whose communications are totally controlled by a single alter organization, and zero, for an organization who does not need any particular other in the network for communication.

First, the aggregate constraint between types of organizations is calculated to continue the discussion of the position and importance of the state and private sectors in governance policy negotiations. Second, the constraint is linked to policy process efficiency in issue areas: six subnetworks are separated from the original network, based on the six themes under which the various policy instruments and measures are placed. The placement of each organization in the subnetworks is based on self-reported primary interest, leaving out the considerable overlap of the organizations in the network. Then, the aggregate constraint is calculated for each of these subnetworks. The link to policy output in the networks is made using a rough measure of policy instrument count in the group. The measure ignores the considerable differences between various policy instruments in their actual environmental impact. Yet, as the impacts of policy in very different areas — greenhouse gas reductions and environmental education, for example

**Table 4.** The average scores on the centrality measures by type of organization.

Type of organization	Average degree	Average betweenness	Average closeness	Average eigenvector
Political	17.500	0.006	0.562	0.132
Administrative	25.285	0.026	0.602	0.149
City subsidiary	29.600	0.022	0.617	0.179
NGO — environmental focus	12.000	0.006	0.522	0.062
NGO — local. citizen focus	9.285	0.003	0.513	0.058
Interest group	11.636	0.004	0.531	0.076
Company	10.000	0.002	0.523	0.065
Total	15.948	0.011	0.550	0.097



— are difficult to measure on the same scale, and since the main interest here is the impact of network structures on policy processes, the use of policy instrument count as a proxy for subnetwork efficiency should be justified.

The aggregate constraint averages for the various types of organizations highlight slightly different features of the structure than the related centrality numbers (Table 5). Communication link building strategies that try to minimize the length of information chains may expose actors to structural holes. This is evident in the scores for environmentalist organizations, which are more central on all of the measures than the other non-governmental groups, but which are more constrained by their network position. As communication between organizations is a scarce resource, establishing a single arrowhead link to the original core of the network can appear to be a beneficial strategy. From the point of view of negotiation theory, however, if structural holes are important bargaining chips in negotiations, it is simultaneously necessary to ensure that one's strong, subgroup network ties do not employ a similar strategy. If this happens, the outcome of the network may give the central actor a position to play the other party against your own subgroup, instead of giving them the ability to use their connections with the network periphery as a negotiation weapon against the central organizations.

The social capital of a single organization can be assumed to be a function of the structural holes they can use (Nan *et al.* 2001). But from the perspective of the macro-level, or possibly the policy-maker or network manager, a higher constraint may result in a more effective network structure. For example, the small world

phenomena (Watts and Strogatz 1998), where even in extremely large networks, the number of communication links needed to send information to any point in the network can remain low, as long as the network is formed as a combination of tight clusters and random cross-network links. Such a network would include a high number of information hubs, which are able to heavily constrain others through intergroup structural holes. Similarly, for a policy network, hub actors can be hypothesized to control the flow of information in the network, resulting in better utilization of the scarce time of all involved.

I have analyzed this using the six policy issue subnetworks and their products, the numerous policy measures produced by the HESP process. The differences in constraint are slightly smaller for the different subnetworks than for the types of actors (Table 6). The amount of constraint is lower for the subnetworks with a wide base of organizations from all different sectors of society, such as greenhouse gases, and higher for strictly professional subnetworks, such as ecological construction. Both private and public hubs are

**Table 5.** The aggregate structural constraint in the HESP network. Averages by organization type.

Type of organization	Average constraint	SD
Political	0.1199	0.02131
Administrative	0.1183	0.03837
City subsidiary	0.0959	0.01846
NGO — environmental focus	0.2124	0.26511
NGO — local. Citizen focus	0.1857	0.07259
Interest group	0.1520	0.04030
Company	0.1530	0.02103
Total	0.1533	0.10944

**Table 6.** The aggregate structural constraint in the HESP policy issue subnetworks and the number of policy instruments produced by each subnetwork.

Policy issue subnetwork	Average constraint	SD	No. of policy instruments
Greenhouse gases	0.1169	0.03396	7
Biodiversity	0.1299	0.05357	6
Urban planning	0.1716	0.06591	12
Ecological construction	0.1847	0.22980	12
City acquisitions	0.1512	0.02637	9
Environmental education	0.1323	0.02733	8
Total	0.1533	0.10944	54

able to place more constraint in these networks, where higher specialization can be expected to result in higher communication costs, as the relevant policy information is more complex.

The result of the policy process seems to provide support for the hypothesis about the efficiency of network control. Higher average constraint is associated with a higher number of policy measures for each of the subgroups — in fact, the Pearson correlation between subgroup network constraint and the number of policy measures associated with each subgroup is 0.942. The correlation coefficient itself obviously has little value in relation to six cases, but the strength of the association between network structure and policy instrument output can be qualitatively assessed as very high. The presence of brokering actors is necessary for the functioning of the network (Gould and Fernandez 1989).

Thus, the policy effects of structural holes appear to be almost contradictory from the point of view of a single organization, and of the network as a whole. The struggle between influence and compromise has always been an important feature of policy networks (Laumann and Knoke 1987). For an organization actively involved in policy processes, this is a necessary trade-off: the expertise of others cannot be mobilized without granting them some influence in the process. Powerful positions can still be maintained through the use and building of structural holes.

## Network subgroups

The third part of the analysis focuses on subgroups with no exogenous definition occurring in the network itself, such as the issue areas used in

the previous chapter. Smaller cohesive subgroups or cores are technically called  $k$ -cores, where  $k$  is the minimum number of connections required within the group for an actor to be included in the core. In a policy network, the issue of interest is how these groups are formed. They can focus on a tight inner core, or they may support the hollow state hypothesis (Heinz *et al.* 1990). Alternatively, they may concentrate more on the issue areas themselves. As the formation of the HESP network was more or less voluntary for the organizations, it is interesting to see where the actors' decisions resulted in clique-like structures.

The cores in the network start at the trivial 1-core, where only a single tie is required for inclusion, and, for the HESP network, range to the highest observed core, the 13-core. The core structures may be nested or separate. If we focus on the higher-level structures and the different types of organizations in the network, three interesting core structures appear (Table 7). The group of city administration and subsidiaries is the most connected. Communication within the city organization is often mandated, so the structure should be fairly unsurprising. Another core is formed of environmentalist non-governmental organizations and interest groups. The third core includes residents associations and private companies. These somewhat unexpected communication groups can be hypothesized as resulting from a difference in interest focus, if not a similarity of interests as such. The environmentalist/interest group core is more concerned with general issues, the residents/companies core with local, specific issues. Even though the cores may form around struggling preferences, it is plausible that specific local plans are more important to the latter groups, and general guidelines to the former.

**Table 7.** The largest cohesive subgroups in the HESP network and the member organizations by type.

Core	Type or organization							Total
	Political	Administration	City subsidiary	NGO — env.	NGO — local	Interest group	Company	
9	0	1	0	2	5	2	8	18
10	0	4	0	5	1	4	0	14
11	0	3	0	0	0	0	0	3
12	1	3	0	0	0	0	0	4
13	1	9	5	0	0	0	0	15
Total	2	21	5	11	14	11	14	78

An analysis of the cores in comparison with the previously used six policy issue areas gives a similar picture of the policy cores in Helsinki environmental policy (Table 8). The highest level core and the administrative organizations are distributed evenly in all the issue areas — they were given the task of chairing the formal policy issue area negotiations. Two core structures were observed in the substance areas. The closeness of the issues biodiversity, urban planning, and environmental education is the first structure; the second includes greenhouse gas, urban planning, and ecological construction. While there are obvious technical rationalizations for most of these pairings, the high activity of the urban planning and traffic organizations is interesting. Planning is a very important part of city administration activities, and local policy. The role of urban planning organizations probably reflects this: whatever the environmental policy issue is, the resolutions need to include planning.

No extreme core or a core versus a periphery structure was found in the analysis. Still, the central administration has not lost its coordinating role in local environmental policy, at least not to the same degree as has federal policy making in the US (Laumann and Knoke 1987). The cohesive subgroups observed are probably results of both administrative reasoning and substantial policy thinking.

Discussion

Modern policy processes are open, complex processes, in which simple explanations based on formal law and government do not aptly

describe decision-making. Here, the attempt has been to employ numerical data and the methods of social network analysis for a more accurate description of policy making. The network summary was found to efficiently capture the relevant features of policy decisions in Helsinki urban environmental governance. Centrality, structural holes and core-periphery structures efficiently describe the network and explicitly link it to policy decisions.

The main finding is that dense and connected local networks, combined with sparse networks with information brokers enabling communication between network regions, are able to perform and produce the required policy instruments and documents. The Helsinki network acted as a mixture of a communication network and a negotiation network. It neither searched for technical solutions nor divided a single, pre-determined prize. Even when the general goals of environmental policy were agreed upon, the technical solutions themselves had a political aspect.

In modern governance, even outside the local sphere and the environmental focus, the situation is often similar. The goal-definition and the instrument selection cannot be separated. When this is the case, the approach presented here should be fruitful, as the network composition can result from any type of interest. The Helsinki case was particularly fitting for the analysis, as the network and the public-private relations were explicitly included in the programme. Still, the descriptive strength of the approach should be beneficial as long as the goals and instruments of policy are interdependent.

The summary description of the decision-making network made here should then be taken

Table 8. The largest cohesive subgroups in the HESP network by predefined issue area.

Core	Policy Issue Networks						Total
	Greenhouse gases	Biodiversity	Urban planning	Ecological construction	City acquisitions	Env. education	
9	5	0	5	8	0	1	19
10	0	4	5	0	0	4	13
11	0	0	0	0	2	1	3
12	1	0	0	2	0	1	4
13	4	1	1	3	4	2	15
Total	12	7	22	15	10	12	78

as a step toward a comparative methodology of networked governance. The methodology should be the simplest feasible description of important network statistics. Such descriptions would be comparable over different institutional settings, even over different levels, if the definitions of the key terms — the actors and their ties — are sufficiently generic. The networks, and more importantly their results, the policies, could be statistically analyzed, which would be necessary to uncover the mechanisms behind policy choice. The interplay between technical expertise that is needed to solve policy problems and the traditional influence or power in different policy sectors would be a particularly interesting question.

The approach presented here could be particularly useful for comparative local governance research. At the local level, the institutions vary tremendously between countries and areas. So far, research has focused on the various institutional settings and the framework provided by governance has been interpreted differently in different settings (Eckerberg and Joas 2004). The network approach would, hopefully, be able to offer a comparison across institutional frameworks, as it does not presuppose any particular structure.

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